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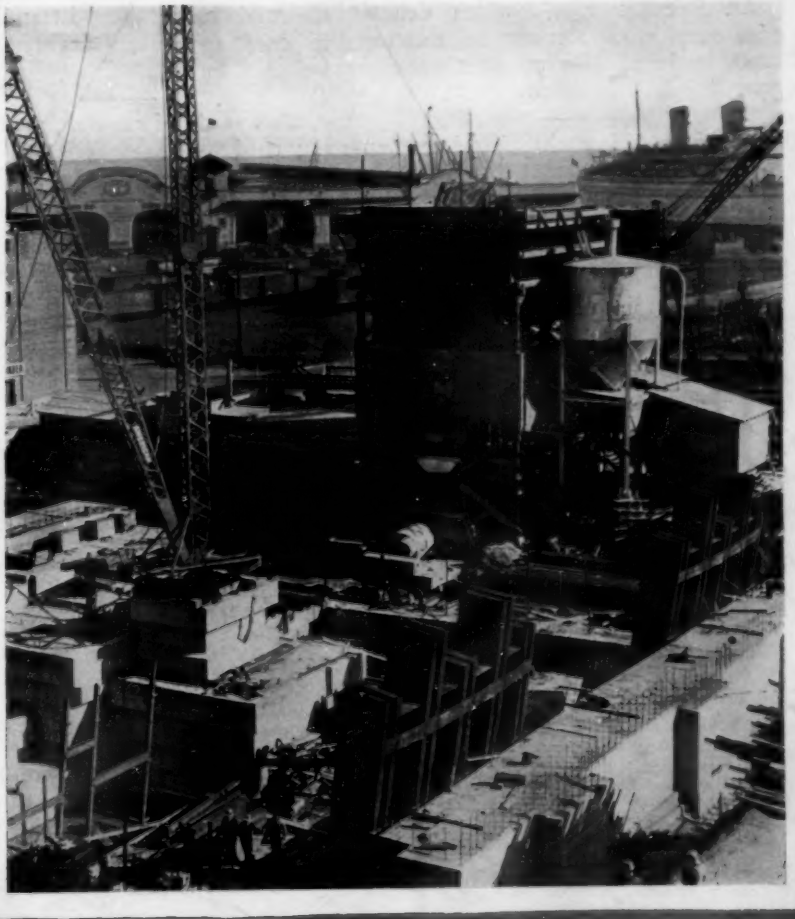
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



FEBRUARY 3, 1934

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VOL. XXV *No. 669*

The Weekly Summary of Current Science

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DO YOU KNOW?

More than 100 firms are selling air-conditioning equipment.

Birds are not the only long-distance travelers; caribou of North America are known to migrate 800 miles.

Among Alaskan Indians and Eskimos, the village and not the tribe is the governing unit, the villages being widely separated.

The giant panda of western China was first discovered by travelers when a French missionary saw one of these rare animals, in 1869.

An "electric nose," which detects even very small amounts of mercury vapor in the air and sets off a warning gong, has been invented.

Within a few weeks after Roentgen discovered X-rays in 1895, physicians had begun using them in examining broken bones.

The population of India increased by 34,000,000 from 1921 to 1931.

Investigations show that there are about 3,000 cases of undulant fever in France each year.

At Crater Lake, Oregon, last winter the total snowfall was 879 inches, or more than 73 feet.

As recently as 20 years ago, tuberculosis in cattle was generally thought to be an uncontrollable disease.

Cases of children with mottled teeth have recently been found in Iowa, and the condition is believed traceable there to drinking water from certain deep wells.

Mats made of canes or reeds are being tried as foundations for roads in one low section of Holland where lack of enduring road beds has been a serious problem.

WITH THE SCIENCES THIS WEEK

ARCHAEOLOGY

How many tombs have been opened at Monte Alban? p. 76.

When did man begin to make tools? p. 69.

ASTRONOMY

How long will the paradox eclipse be total at an observation point? p. 71. *Eclipses of the Sun—S. A. Mitchell—Columbia Univ. Press*, 1932, $5.

What is the largest star in Orion? p. 75. *Other Worlds—Edwin Lincoln Moseley—Appleton*, 1933, $2.

How much does the temperature of the McDonald 80-inch telescope mirror drop in a day? p. 68.

ASTRONOMY—PHYSICS

How many nebulae are in two per cent. of the sky seen from Mt. Wilson? p. 72.

AVIATION

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GEOLOGY

How did the great California storm change the geography of the state? p. 74.

MEDICINE

When was yellow fever vaccination announced? p. 78.

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How high does a stratosphere sounding balloon rise? p. 67.—*The Drama of Weather—Sir Napier Shaw—Macmillan*, 1933, $3.50.

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How would the cathode-ray finder locate ships? p. 72.

OPTICS

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ORDNANCE

Is overloading likely to burst a shotgun? p. 72.

ORNITHOLOGY

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Where have Army bombs ceased killing ducks? p. 74.

Where was the wingless rooster raised? p. 70.

PALEONTOLOGY

What is the Paleontological Research Institution? p. 73.

PHYSICS

How much heat could a pound of heavy hydrogen give off in atomic energy? p. 76.

How was radium found in iron ore? p. 70.

What camera magnifies 30 billion times? p. 67.

PLANT PHYSIOLOGY

How may starchless potatoes be raised? p. 72.

PUBLIC HEALTH

What prompted the reorganization of the Manchurian Anti-Plague Commission? p. 77. *Riders of the Plagues—James A. Tobey—Scribner's*, 1930, $3.50.

These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information for the article, but are references for further reading. Books cited can be supplied by Book Department, Science News Letter, at publishers' prices, prepaid in the United States.

PHYSICS

Chance Discovery May Yield Metal-Plating Method

"Electron Camera" Shows How Zinc Particles Dissolve Into Liquid Surface Layer of Polished Copper

THE DISCOVERY that the surface of polished metal is liquid promises to lead to a new method of metallic plating. This advance may result from a few seconds of startled watching of the picture thrown on a screen by an "electron microscope."

In a few fleeting moments, Prof. G. I. Finch and two young research students, Dr. A. G. Quarrell and J. S. Roebuck, at the Imperial College of Science, London, found definite proof of a hypothesis put forward many years ago by the late Sir George Beilby, the director of fuel research for the British Government during the World War.

Prof. Finch and his colleagues were working with a special type of science's new instrument called the electron-diffraction camera. This wonderful "camera," in which a stream of electrons throws an image on a fluorescent screen, in effect magnifies the object 30,000,000,000 times, compared with the 2,500 or 3,000 times of ordinary microscopes.

They were experimenting with a piece of polished copper which was being bombarded with particles of zinc emitted from a zinc wire rapidly heated in a vacuum by an electric current. Many times before similar experiments had been made, the scientists studying the shapes of crystals thus deposited on metal surfaces. But this happened to be the first time that the bombarded metal had been polished.

As usual a diffraction pattern was shown on the fluorescent screen—a score or more of bright circles. But to the intense surprise of the watchers this pattern gradually weakened, became less bright and within three seconds had completely disappeared. They tried again. A second, a third and a fourth film of zinc was projected onto the copper. Each disappeared in the same way as the first, but each diffraction pattern lasted longer than the preceding one, until the twelfth pattern remained—meaning that the twelfth layer had stood fast.

"What this means," Prof. Finch told the Science Service correspondent, "is that the incoming crystals of zinc were being dissolved in the liquid layer of the polished copper. Like snowflakes falling on water, the crystals rest for a moment on the surface and then disappear.

"That this should happen at all is presumptive evidence that the top layer of the polished metal is liquid. But the real proof is that with this experiment we can only observe an electron pattern when the zinc crystals are on the top of the liquid surface, and not before they arrive or after they have disappeared. No pattern means no crystals —which is what physicists call the 'solid liquid' state.

"The twelfth layer of crystals standing fast simply means that the liquid copper has reached its saturation point, has dissolved all the zinc that it is capable of holding. This is supported by the fact that when the zinc bombardment was turned on polished iron the zinc layer stood fast at only the second attempt. Zinc is less soluble in iron than in copper, and so one would expect the liquid layer of iron to be saturated more quickly."

Prof. Finch has found that the films of zinc or other substances thus deposited on polished metal can never be completely removed without removing the metal itself. An alloy has, in fact, been formed. This process, which he terms "vacuum-plating," has, he believes, great commercial possibilities as a substitute for electroplating. A systematic investigation is now being started.

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STRATOSPHERE CRAFT

Dr. Rossby, left, is holding the balloon which will carry into the stratosphere the bamboo frame and meteorological instruments held by Dr. Bjerknes. The delicate instruments are in the white container.

METEOROLOGY

Stratosphere Under Heavy Attack by Scientists

STRATOSPHERE weather secrets are being subjected to barrage attack by scientists of many countries.

In the United States and from a number of points in Europe sounding balloons are being released every day during January to carry instruments high into the rarefied atmosphere.

And now Director Carl G. Rossby of the Massachusetts Institute of Technology meteorological laboratory has announced an even more concentrated assault. Within the next few weeks, when conditions for this special study are right, forty balloons will be released from St. Louis at intervals of about two hours. The meteorological airplane of the Massachusetts Institute of Technology will make observations to 17,000 feet at the same time.

The balloons when inflated measure four feet in diameter. Each carries specially designed instruments weighing only a few ounces which automatically record temperature, humidity and atmospheric pressure. They will finally burst and the instruments do a parachute drop to earth, in shock-absorbing frames made of split bamboo. Each set of instruments bears an identification tag

offering a five-dollar reward for its safe return.

Dr. J. Bjerknes, prominent Norwegian meteorologist who is now visiting the Massachusetts Institute of Technology, will cooperate at Cambridge with Dr. Hurd C. Willett of the Institute staff in making the forecasts upon which the release of the balloons will depend. A mid-continent location was chosen for the experiments so that the balloons will not be lost over the ocean.

The daily stratosphere soundings are being made from Omaha, Nebr., by the U. S. Weather Bureau in cooperation with the International Upper Air Commission. Data gathered by all countries engaged in the research are to be published by the Commission so that the results may be readily studied by meteorologists everywhere, L. T. Samuels of the Aerological Division of the Weather Bureau explained.

The barograph used by the Weather Bureau descends to the earth slowly beneath a parachute that opens after the balloon bursts. The balloons usually rise about eleven miles or more, and have been known to reach an altitude of twenty miles. Most of the returned instruments are found within fifty miles of the take-off, though some have been sent in from distances of several hundred miles.

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ASTRONOMY

Stellar Looking-Glass Slowly Cooling

A HUGE looking-glass for the stars which will eventually serve science in the 80-inch reflecting telescope of the new McDonald Observatory, in Texas, is now slowly cooling in the Corning Glass Works, Corning, N. Y.

Its temperature is dropping two to four degrees a day from the high heat that the molten glass had when it was poured. In about three months the huge disc, a foot thick, nearly seven feet in diameter, weight 5,600 pounds, will be ready for shipment to Cleveland where experts of Warner & Swasey Co. will spend from one to two years grinding its face into a very precise concave optital shape.

McDonald Observatory, whose chief telescope will have this 80-inch mirror, is being erected on Mt. Locke in the Davis Mountains of Texas. It will be operated jointly by the University of Texas and the University of Chicago.

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AVIATION

Superiority Predicted For Rotating Wing Aircraft

Research Will Make Autogiro and Gyroplane Faster Than Conventional Airplane, N. A. C. A. Engineer Believes

FLYING machines with rotating wings will be superior to the conventional airplane as soon as their possibilities for high speed are practically developed, John B. Wheatley, aeronautical engineer of the National Advisory Committee for Aeronautics, predicted to the Society of Automotive Engineers.

The autogiro and the gyroplane are the two types of rotating-wing aircraft which, according to Mr. Wheatley's analysis, have the possibilities of becoming superior to the conventional type of fixed wing airplane now widely used. The reason for the pronounced possibility of the autogiro and the gyroplane is the inherent ability of their rotors or moving wings to attain their maximum lift-drag ratio at any desired forward speed.

The novel cyclogiro, with the paddle-wheel wings, is rated by Mr. Wheatley as being approximately equal in merit to the airplane, while the helicopter is definitely inferior.

The autogiro is the best known of all rotating-wing aircraft. It was invented by Juan de la Cierva, and the American version of the autogiro which has been flown extensively in this country was produced by Harold F. Pitcairn, working with the Spanish inventor.

Gyroplane

The gyroplane is sponsored by E. Burke Wilford of Philadelphia. The autogiro and the gyroplane present a very similar appearance with blades that rotate freely under the action of air forces about a vertical axis, replacing to a large extent the conventional wings of the airplane. Mr. Wheatley explains that the aerodynamical principles of the autogiro and gyroplane are practically identical and that their differences are largely structural.

"The low-speed control is superior to that of the airplane," Mr. Wheatley said in reference to the autogiro and the gyroplane. "The reliability is equivalent to that of an airplane, and emergency landing will be easier. The low-speed performance is superior to that of an airplane. Airplane high speeds will probably be exceeded. Control system is as simple and easy to use as that of the airplane. First cost will be slightly higher, but maintenance and operating costs will be equivalent to that of airplane."

The rotating-wing type of machine is likely to be used by the private flyer and the unskilled pilot because of its increased safety and the smaller landing field required for it, Mr. Wheatley emphasized. Almost all the hazards encountered in flying an airplane are connected with the phenomenon of a gradual weakening of control as the flying speed approaches its minimum, he explained. As minimum speeds range from 50 to 75 m.p.h. an undesirable premium is placed upon piloting technic during landings and take-offs. A rotating-wing aircraft suffers very slightly from these handicaps because the relative velocity of the lifting surfaces to the air is independent of the translatory velocity of the machine and is always large, so that the angle of attack of the lifting surfaces is well below the burble point. The resultant performance of rotating-wing aircraft thus materially extends downward the low-speed phase of flight, lessening the piloting skill required for emergency landings and take-offs, and making the pilot more independent of meteorological conditions because at low speed a shorter visibility is required for the same safety.

Cyclogiro

The cyclogiro, which Mr. Wheatley rates as being approximately equal in merit to the airplane, is of such recent origin that it has not yet been demonstrated at full scale. It consists of a fuselage of conventional form, supported in the air by power-driven paddle-wheel wings, one on each side. The paddle-wheel rotors perform the functions of both the wings and the propeller of the conventional airplane.

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TWIN TO AUTOGIRO

This is the gyroplane, which is very similar to the better known autogiro in both appearance and behavior. Intensive research on this type of aircraft is being conducted by the National Advisory Committee for Aeronautics at its Langley Field laboratories. The autogiro has already been given considerable attention by the N. A. C. A.

ARCHAEOLOGY

Man Made Tools in Dim Age "At Present Unspecified"

J. REID MOIR, British archaeological pioneer who has worked tirelessly to unearth the dawn age of man's life on earth, has sprung a new surprise.

Twenty-five years ago Mr. Moir startled conservative scientists by showing some queer-shaped flints he had dug up near his home in Suffolk, southeast England. He called these stone objects the handiwork of men living in the Pliocene period of world history. If true, that would mean that man was using his hands and brain intelligently, to make tools, earlier than had been demonstrated.

Gradually, scientific incredulity changed to scientific cooperation. Mr. Moir's flint objects, which he continued to unearth in East Anglia, have been widely accepted as works of man. Examples of these old, old stone implements are among the exhibits of early man in the American Museum of Natural History in New York, the Field Museum in Chicago, and the British Museum in London.

So, Mr. Moir has proceeded to the next stage in his task, and doubtless to a new controversy. He attempted to sort out these very ancient relics of man in England, with a view to learning more definitely how old they are.

In a report to *Nature*, he now announces "certain unexpected and far-reaching conclusions."

The scientific bombshell is that among these rows of flint pieces, which would have little to distinguish them in the eye of a layman, Mr. Moir sorts out "four distinct and different groups of implements."

What of it? Simply that the progress from one to another of those four kinds of stone tools may be measured in tens, perhaps hundreds, of thousands of years. The men who made the four kinds represent possibly several hundred thousand years of man's history and "progress."

The age ends in the Late Pliocene which is a time variously estimated to be several hundred thousand to a million years ago. But it is the beginnings that are more dramatic. Mr. Moir assigns one well-made curved implement, of the kind called an "eagle-beak," to an age older than the Lower Pliocene stratum of the site. And this eagle-beak is still not so old as the implements Mr. Moir considers the earliest.

There, Mr. Moir leaves his problem, having pushed his old weapon-makers back into an age which he calls "at present unspecified."

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VETERINARY MEDICINE

Water Snakes in Zoo Had Amebic Dysentery Epidemic

DURING the past summer and fall, while the medical profession and public health officials were much disturbed by the outbreak of amebic dysentery among visitors to the Chicago fair, the water snakes and other reptiles in the Philadelphia Zoological Garden were suffering from a similar ailment.

In describing this condition of snakes in *Science*, Dr. Herbert L. Ratcliffe and Quentin M. Geiman of the University of Pennsylvania and the Laboratory of Comparative Pathology of the Zoological Society of Philadelphia state that although reptiles have long been known to be parasitized by amebae similar to those which cause dysentery in man, these protozoa have not been recognized heretofore as causing disease.

The infection in the water snakes amounted to an epidemic but there were isolated cases among other reptilian species also. The source of infection has not been determined. So far, no symptoms of the disease have been noted and infections have not been recognized until after death. As in amebic dysentery of man, disease changes consisted of ulcers in the large intestine and abscesses in the liver. In two instances, however, the amebae also caused gastric ulcers, which of course is not true in man.

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GEOGRAPHY

Huge Photographic Map of Indian Lands to be Made

A HUGE airplane photographic map, 40 by 24 feet, of the Navajo and Zuni Indian lands in New Mexico, Arizona and Utah, has been contracted for by the Department of the Interior. It is to be used as a basis for the better regulation of grazing practices, which have already gone to severely damaging excess in many small and a few large areas.

Airplanes making the photographs will fly at an altitude of over 20,000 feet, taking more than 4,500 individual photographs with a special four-lens camera. The separate pictures will be fitted together into a single mosaic map.

Total cost of the work will be about $77,000; but if the work were done by ground parties it would cost more than $500,000.

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PHYSICS

Hardest Known Cosmic Rays Found in Iron Mountain

NEW penetrating cosmic rays, the "hardest" known, have been discovered by Dr. Axel Corlin of the Lund Observatory, Sweden, who has reported his researches to *Nature*.

He carried out his experiments in an iron mine in a mountain near Kiruna where the cosmic ray measuring apparatus could be placed in the mine's galleries so as to be shielded by known layers of the iron ore.

Cosmic rays that had considerable energy after having penetrated 160 meters (525 feet) of ore, which is equivalent in shielding to 800 meters (2620 feet) of water, were detected. They were "harder" than any previously found, with an absorption coefficient a tenth that of the hardest component of the intense cosmic rays measured by Prof. E. Regener of Stuttgart, Germany. Dr. W. Kolhörster, another German physicist, however, has measured in the depths of a Stassfurt salt mine, cosmic rays of 700 to 800 meter maximum penetration that approach more closely in intensity those discovered by Dr. Corlin. About 200 meters (650 feet) of water is sufficient to eliminate most of the cosmic radiation.

To his surprise, Dr. Corlin found that the iron ore contained some radium, five hundredths (0.05) milligrams per ton. Dr. Corlin believes that this is the first time that radium has been found in iron ore. The radiations from the radium affected the measuring device but after allowing for the effect of the radium radiation there remained a residue effect which Dr. Corlin feels can only be accounted for by extremely penetrating fraction of cosmic rays.

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EDUCATION

Correspondence Course Mortality Found High

THE AMBITIOUS boy who follows the advice in inspirational pleas to "secure advancement by taking a course in——" all too often meets with discouragement and failure because the course he chooses is not fitted to his needs or abilities. The mechanic wants to be a salesman, and the salesman wants to be an aviator.

In the course of a study of the vocational assets and liabilities of unemployed men during the depression investigators of the Employment Stabilization Research Institute of the University of Minnesota compiled data concerning the correspondence courses taken by these men and the results, if any, of their efforts.

One out of every ten of the men examined by the Institute in their survey had enrolled for correspondence courses of a vocational type. Some have been aided by them to better positions or to better accomplishment in the positions they held. But tales of failure and discouragement are many and amazing.

The "mortality" of these students is extremely high. Forty per cent. dropped out before the end of the first year and two-thirds dropped within 15 months. Of those taking business courses, about a third gave up within six months. Only 6 per cent. indicated that they succeeded in completing their courses.

Only 28.6 per cent.—29 men out of a hundred—ever succeeded in obtaining a job in the occupation for which the course was to train them. And an even smaller proportion, 22 per cent., possessed the ability (as shown by tests) to do that kind of work, even had they been able to secure the job.

The difficulty is not necessarily with the correspondence course or with the student, Drs. Charles Bird and Donald G. Paterson, who reported the study, conclude. Rather it is with the pathetic fact that man's ambitions so far excel his ability—his vision so far exceeds the distance he can run.

"If correspondence schools would set up personnel bureaus and avail themselves of measuring instruments whereby adult students could be guided to suitable courses, their courses of training would meet a sorely felt need in the field of adult education," is the conclusion of the investigators.

"Until they undertake this service, efforts of the hit-or-miss variety coupled with intensive advertising and sales campaigns must continue to brand most of these schools as merely profit-making institutions. And of more serious import, they are contributing to the formation of an unhappy and maladjusted citizenry."

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ORNITHOLOGY

Wingless Rooster Studied At Smithsonian Institution

A ROOSTER without wings is the strange freak of nature recently received by the Smithsonian Institution. It has been given quarters at the National Zoological Park, where it is being studied by Dr. Hurbert Friedmann.

Fowls without wings are hatched occasionally, but all hitherto reported have died while still young chicks. The present specimen, a Plymouth Rock, grew to healthy adulthood in the flock of Mrs. Olio Deering of Rose Hill, Ky., who sent it to the Smithsonian Institution. Its parents were normal birds.

The wingless rooster's behavior seems to be normal in most ways, but its abnormal structure does seem to handicap it. It is afraid to make jumps that would mean nothing to the ordinary chicken. Placed hungry on a table, with ample food strewn on the floor, it hesitates a long time before making the jump.

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▼ RADIO ▲

INSULIN AND DIABETES

an address by

Dr. V. du Vigneaud

Professor of biochemistry at the George Washington University School of Medicine

Wednesday February 7, at 4:30 p. m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

ASTRONOMY

Paradox Eclipse Will End The Day Before It Begins

Sun's Shadow, Racing Eastward, Crosses International Date Line; Two Small Islands Only Observation Points

By CAPT. J. F. HELLWEG, U.S.N.,
Superintendent, U. S. Naval Observatory

THE COMING total solar eclipse, February 14-13, will go down in history as the paradox eclipse, the eclipse that ended the day before it began.

This is not a "trick" statement but it is just an unusual result following from natural causes.

The eclipse will start in East longitude and after sweeping across the Pacific, will finish in West longitude, crossing the date line—the 180th meridian—therefore losing one calendar day.

The solar eclipse will begin off the Malay Peninsula at sunrise on St. Valentine's Day, Wednesday, the fourteenth of February, and will finish off the Alaskan coast at sunset on the afternoon of the day before, Tuesday, the thirteenth of February.

Almost the entire portion of the earth's surface over which the moon's shadow will pass is confined to the Pacific Ocean. The outer limits of the shadow will pass over Eastern Asia, Northern Australia, and the extreme western part of North America, but these countries are so near the edge of the path of the eclipse that its darkening effect will scarcely be noticed.

The total eclipse will be visible only within a relatively narrow path varying from 60 to 80 miles in width. The eclipse path will begin about 200 miles off the Malay Peninsula and will follow a slowly curving course across the Pacific. At first, the course of the eclipse path will be a little to the South of East. It will then curve very gradually toward the North. In fact, it will curve so slowly that nearly one-half of its course will lie between 2 degrees and 6 degrees North latitude. It then will take a northeasterly course, and the eclipse will end off the coast of Alaska.

Although the eclipse path passes over Northern Borneo and the Northern tip of the Celebes and a few islands off its coast, these locations are all too near the beginning of the eclipse to permit observations of any scientific value. If viewed from any of these positions, the eclipse will be so near the horizon that the moon's shadow cone will be very nearly tangent to the earth's surface and will therefore travel too rapidly to be observed with any success.

With the exception of two small islands, Losap and Oroluk in the Caroline group, the eclipse will pass over no other islands or coral reefs. Under these circumstances, all observations must be made from the decks of ships within the path of totality, or on the two islands, Losap and Oroluk.

Losap lies a little nearer the central line of totality than Oroluk, and therefore is more suitable for observation stations. At a point of Laol, one of the Losap group, Longitude 152 degrees 43 minutes East, Latitude 6 degrees 54 minutes North, the duration of totality will be 2 minutes 5 seconds.

These islands are located on an atoll reef 5 miles in a north and south direction and 2 to 4 miles in an east and west direction. The lagoon within them is reported to be comparatively free from shoals and affords an excellent anchorage for light-draught ships.

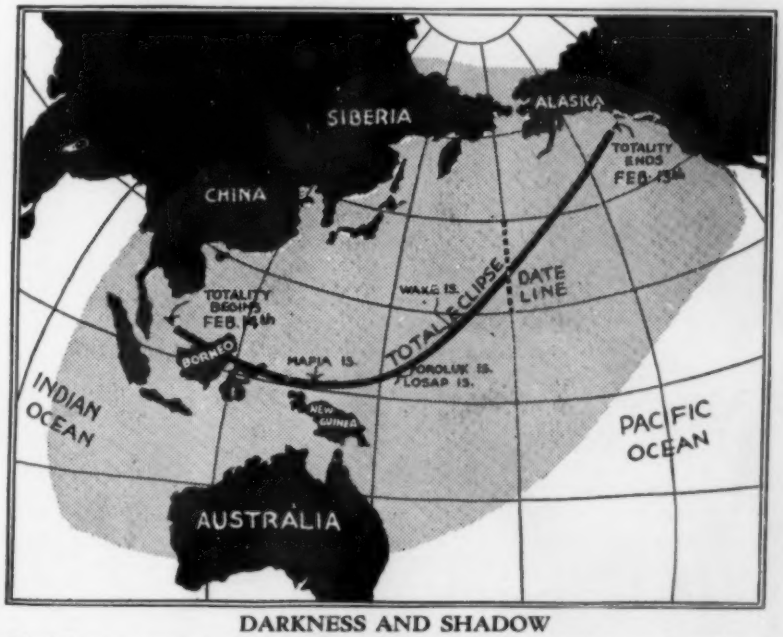
The pilot charts furnished by the U. S. Naval Hydrographic Office show that the weather is usually clear in that region during the month of February. The prevailing winds are from the northeast with a velocity of 11 to 18 miles per hour.

Losap is 50 miles southeast of Truk, the large group in the Caroline Islands, and the seat of government for the central islands.

The total phase viewed from these islands will occur at about 10:17 a. m. local civil time. The altitude of the sun at that time will be 55 degrees. With the sun so near the zenith, the effect of refraction errors will be greatly reduced.

Losap and Oroluk are under the control of the Japanese government which is extending courtesies to parties of foreign astronomers who may desire to join Japanese expeditions organized to observe this coming eclipse.

When expressed in the world time (Greenwich Civil Time) and 24 hour day that is used by the astronomer, the progress of the eclipse will, of course, be continuous in time as well as by the calendar, beginning on February 13 at 22 hours 5.1 minutes at East Longitude 120 degrees 45 seconds, South Latitude 6 degrees 35 seconds. It will end, expressed in Greenwich Civil Time, on February 14 at 3 hours 11.3 minutes at West Longitude 146 degrees 40 seconds, North Latitude 42 (*Turn to Page* 75)



DARKNESS AND SHADOW

The black line represents the path of totality; all of the shaded earth surface will be covered by the moon's shadow.

PLANT PHYSIOLOGY

Bacteria Help Produce Starchless Potatoes

POTATOES practically without starch, which is the very essence of potatoes, have been raised under experimental conditions by Dr. R. F. Suit of Macdonald College and Dr. Harold Hibbert of McGill University, Montreal, by injecting into their stems cultures of bacteria that have the power of changing starch into sugar-like compounds.

Previous researches by Dr. Hibbert had shown that certain species of bacteria secrete enzymes that change starch and cellulose into sugars and related compounds, when they did their work in glass vessels. It was decided to try whether these same enzymes could work the same changes "in vivo," that is, in a living organism.

Accordingly the main stems of young potato plants were cut off, and quantities of one of the bacterial species were injected into them at frequent intervals until the plants were mature. Then the tubers were dug up and tested for starch by the familiar iodine reaction, which produces a vivid purple color wherever starch is present.

Slices of the tubers, when thus tested, showed a purple ring for about an eighth of an inch around the outside, but no purple color whatever in the center, where starch is usually most abundant. The food stored in these potatoes was evidently in some form other than starch.

Science News Letter, February 3, 1934

NAVIGATION—PHYSICS

Cathode-Ray Finder Would Locate Ships

A NEW type of direction-finder, incorporating a cathode-ray oscillograph, has been devised by L. H. Bainbridge Bell, of the Government Radio Research Station at Slough, Buckinghamshire, England. It shows the bearing, course and approximate distance of all large shipping within a distance of ten miles, provided that the ships are sending out the signals required by the new system.

The instrument has a dial marked with the points of the compass. Whenever signals are received bright green arrows appear behind the dial. The direction of each arrow gives the bearing of the corresponding ship and its thickness indicates her distance. The approximate courses of the ships are deduced as soon as subsequent signals are received.

If the arrow has become thicker the ship is approaching the course of the ship receiving the signals, and if it steadily continues to become thicker the receiving ship must alter her course to avoid a collision. A more exact determination of the course can be obtained by the usual triangulation principle.

If the system is internationally adopted all fogbound ships will send out every twenty seconds a signal consisting of a Morse "dot," the signal itself lasting only a thousandth of a second, so as to reduce interference to the minimum. The signals are received on two fixed loop-aerials, mutually perpendicular, which are connected to electrically similar amplifiers. The outputs from these amplifiers, at the original radio frequency, are applied to the two pairs of deflecting plates in a cathode-ray oscillograph. The screen of the oscillograph forms the indicating dial of the instrument.

Science News Letter, February 3, 1934

AVIATION

Airplane Cabin Made Quiet as Other Vehicles

NOISE within airplane cabins can now be suppressed so effectively that airplanes can be made to compare favorably in noise characteristics with other transport vehicles, Stephen J. Zand, aeronautical research engineer of the Sperry Gyroscope Co., told the Society of Automotive Engineers.

By using a special acoustic absorber consisting of an inexpensive stretched fabric to which is cemented a special felt, an airplane cabin can be soundproofed so as to reduce an outside noise of 90 decibels to less than 75 decibels. A 90 decibel level of sound is distinctly troublesome but conversation in normal tones can be carried on when the noise level is from 65 to 75 decibels.

The soundproofing of the airplane cabin can be accomplished by materials weighing only 200 pounds or about 15 pounds per passenger, an increase of 100 pounds or 7½ pounds per passenger over inside coverings of the cabin without soundproofing qualities.

It was found that the noise level in the cabins decreased with increased altitude, a noise of 73 decibels on the ground decreasing to 60 decibels at an altitude of 20,000 feet.

Science News Letter, February 3, 1934

IN SCIENCE

ASTRONOMY—PHYSICS

Seven-Foot Elbow Room Assigned to Molecules

TAKE ALL the molecules in the universe. Distribute them evenly. Each would be separated from its neighbor by a distance of seven feet.

Prof. William D. MacMillan of the University of Chicago has arrived at this figure, using Dr. Edwin P. Hubble's estimate of the number of "island universes" or nebulae far beyond our own Milky Way galaxy.

Dr. Hubble drew his conclusions from a count of nebulae on 1,283 photographs taken with Mt. Wilson Observatory's 60- and 100-inch telescopes. On these photographs covering two per cent. of the three-quarters of the sky seen from Mt. Wilson, Dr. Hubble found approximately 44,000 nebulae. With even distribution of nebulae in the universe, there would be about 75,000,000 of these gigantic star systems in the vast space sphere visible to the largest telescopes. Light takes about 300,000,000 light years to come to earth from the outposts of the visible universe.

Science News Letter, February 3, 1934

ORDNANCE

Plugged Barrels Cause Shotgun Failures

WHEN a shotgun barrel bursts, you may be sure that the cause was some obstruction in the end of the barrel, not an overloaded shell or obstruction at the breech. This is the conclusion of Prof. William J. Conley of the University of Rochester after experiments in which he used shotguns salvaged from junk shops.

Double and triple loads had no effect on the ramshackle 12 gauge guns, but when the gun's muzzle was plugged with mud or snow the barrel invariably burst or bulged near the end. Even half an inch of soft snow in the muzzle resulted in an explosion of a gun held in a vice, so violent that a piece of it flew back 50 feet and hit the door shielding Prof. Conley.

Science News Letter, February 3, 1934

NCE FIELDS

PALEONTOLOGY

Fossils of Ice Age Animals Found Near San Diego

FOSSIL remains of a small Ice Age horse and a giant mammoth which roamed San Diego county 100,000 years ago have been found by Civil Works Administration employees in Mission Valley, San Diego, Clinton G. Abbott, director of the San Diego Natural History museum, has announced.

The remains, several teeth of the horse and a section of the spinal column of the mammoth, were identified by Charles H. Sternberg, paleontologist of the museum.

Only once before have signs of either of these animals been discovered in San Diego county. Two years ago, in a well at San Ysidro, near the Mexican border, a tooth of the Ice Age horse was found, and twenty years ago a mammoth tooth was discovered in San Diego.

"It is hardly possible to set a value upon such a find," Mr. Abbot said. "These animals were extremely rare in this part of the world. It is certainly the greatest paleontological discovery in my experience."

Science News Letter, February 3, 1934

ENGINEERING—RADIO

Short Wave Phone System Serves Bridge Builders

See Front Cover

CURIOUSLY, radio is helping to build a bridge.

Special short wave transmitting and receiving sets make possible communication among groups of contractors scattered on land and water along the eight and one-quarter mile route of work on the San Francisco-Oakland bridge. These men on the job also talk with the head offices and with the office of the state engineer in San Francisco.

The picture of building activity on the cover shows the San Francisco anchorage for suspension cables as it rises to its full 68,000 cubic yard statue. Steel grillage and eyebars, to which the 28-inch diameter cables will be attached, are being embedded in the concrete. The monolith will be 160 feet high, 108 feet wide and 184.6 feet long and is being cast sectionally in interlocking blocks to offer greatest resistance to the pull of the cables.

The bridge is to be a two-deck suspension structure with steel towers rising from 465 to 505 feet which will give boats clearance at high water of from 180 to 214 feet. The upper deck will carry a 58-foot roadway with six traffic lanes for passenger automobiles and light trucks while the lower deck, 31 feet wide, will bear three traffic lanes for heavy trucks and two for interurban cars.

A tunnel 540 feet long, 80 feet wide and 60 feet high is a part of the project. It pierces government owned Yerba Buena island in San Francisco Bay. Anchorages, piers, tunnels and other features of the project are under construction.

Science News Letter, February 3, 1934

PALEONTOLOGY

Professor's Sacrifices Make Institution Possible

AFTER four decades of work in the collection of paleontological and geological type specimens and exhibits, Prof. G. D. Harris of Cornell University has secured a charter from the State of New York for an institution which has been his dream for years. The Board of Regents of the State of New York has granted a charter to the Paleontological Research Institution located in the city of Ithaca and founded by Prof. Harris. It has long been his hope that this should become a national institution and its realization will encourage him to continue with the laborious task of cataloging and collecting thousands of specimens.

When Prof. Harris's numberless specimens from the two Americas at last outgrew the storage space in his office-quarters at the University, he saved up $3,000, built a fireproof museum in his yard and named it the Hall of Types.

The cataloging and collecting which has been going on these forty years has resulted to date in the printing of ten huge volumes on the specimens. These books were printed on his own press, in his basement, by himself. He bought the press with his own funds out of a salary that until ten years ago was not more than $1500 a year. Summers he worked extra to get money for geology expenses.

Science News Letter, February 3, 1934

ENTOMOLOGY

Mosquitoes Dyed Pink For Study

IF YOU see pink mosquitoes (or blue ones) this spring when things warm up again, don't jump to the conclusion that repeal has had a reducing effect on the old familiar pink elephants. The insects' pinkness (or azureousness) will mean only that they have been marked by an inquiring entomologist, who wants to know how long they live, where they go to lay their eggs, how far they can migrate, or other intimate details of their lives of evil, to the end that he may reduce the slap-and-scratch batting average of your community and its incidence of malaria.

The new method of giving mosquitoes distinctive and conspicuous colorings was devised by entomologists of the U. S. Department of Agriculture. It consists in spraying them with an exceedingly fine mist of either methylene blue or eosine, the latter a strongly pink dye. The spray must be very fine, to avoid drowning the insects; but if the nozzle is properly adjusted the mosquitoes dry off in a few minutes and fly away—marked for life.

How long one of these fragile structures of wings, legs and biting apparatus can survive the threats and buffetings of this rough world was vividly shown by a tinted mosquito in the Columbia river region. This veteran was still on the job 104 days after its blue baptism. Some of its companions of the same spray bath were found at a distance of four or five miles.

Science News Letter, February 3, 1934

SEISMOLOGY

Acapulco Earthquake Near Mexican Coast

SUNDAY'S severe earthquake, which caused great damage in the Mexican seaport of Acapulco and other towns in Guerrero, had its epicenter, or point of most violent activity, at sea. Scientists of the U. S. Coast and Geodetic Survey located this epicenter after studying data collected from a number of American and Canadian seismological observatories by Science Service.

The geographic coordinates of the point were given as seventeen degrees north latitude, one hundred degrees west longitude, and the time of origin was 2:09.9 p. m., Eastern Standard Time.

Science News Letter, February 3, 1934

GEOLOGY

Great California Storm Changed Geography

THE GREAT California storm that recently wrought havoc with the works of man, washing away houses, ruining streets, burying automobiles in mud, etc., brought notable changes also to the natural formations along the coast. These have been observed with a scientific eye by Prof. Francis P. Shepard, geologist of the University of Illinois.

"Most of the small intermittent streams which come down from the Santa Monica Mountains into the ocean near the city of Santa Monica," Prof. Shepard states, "are unable to build deltas during ordinary rainy periods because the waves remove the debris almost as fast as it is carried to the sea. The recent unprecedented rains, however, produced such excessive wash that the waves were unable to cope with it and sizable deltas were built during this short period.

"The deltas extend somewhat more to the south of the stream mouths than to the north despite the southerly winds which prevailed during the rain storm. It appears that some counter-current must have developed along the coast.

"Samples of the river water during the storm revealed large percentages of fine sediment, and the ocean water along the shore contained almost as much of this silt and clay. Examination of the deltas at low tide after the storm was over showed that the sediment was entirely sand and gravel, indicating that the fine sediments had been carried out to sea by the waves. This muddy material continued to discolor the water for some time and interfered with fishing miles from the shore.

"Where Beverly Boulevard comes down to the sea through a notch in the high coastal terrace west of Santa Monica, a flood of water 100 feet across and four feet deep swept over the road, in some places burying it deep in debris and elsewhere taking great gouges out of the slab. Where this flood crossed the Coast Highway and spilled over the bank into the ocean a narrow ditch was turned into a complex series of amphitheaters 100 feet or more in breadth, and great mudflows carried away the foundation of the margin of the road. This material eroded at this point was mostly fine and when it was swept into the sea the waves carried it away, leaving only scattered boulders and vast quantities of driftwood on the beach.

"The Coast Highway which extends west from Santa Monica along the base of the mountains has been built in some places along the base of wave-cut cliffs which were abandoned by the sea through the forming of a wave-built beach at their base. The cliffs are almost vertical and are formed on unconsolidated sand and gravel.

"Many homes are located at the tops of these cliffs and at the tops of similar cliffs on the sides of Santa Monica Canyon. It might have been supposed that these precariously located residences would have been endangered by landslides from saturated ground, but these cliffs have had only negligible effects from the rain.

"On the other hand, the road cuts in solid, but weak rock along the Coast Highway were greatly eroded. . ."

Science News Letter, February 3, 1934

METEOROLOGY

Sunspot Storms May Lighten Air

GREATER storminess in the earth's atmosphere, known to accompany an increase in sunspot numbers, may give us lighter air to breathe, through the stirring up of the air strata.

This suggestion is contained in a communication by L. W. Tilton, of the National Bureau of Standards, to *Nature*. The refractivity of the air, or its power of bending a ray of light, is greater when sunspots and storms are fewer, Mr. Tilton says. Other things being equal, increased refractivity means greater density. He therefore suggests as a possible explanation that when the atmosphere is calm over long periods, certain denser components of the atmosphere, perhaps associated molecules or isotopes, settle down in greater numbers and produce at the earth's surface a gaseous mixture having a slightly higher index of refraction.

Science News Letter, February 3, 1934

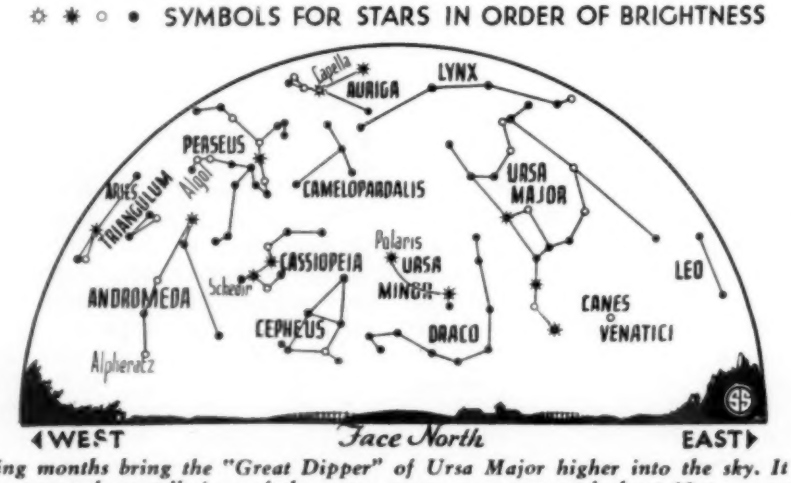
ORNITHOLOGY

Poisoning of Ducks With Phosphorus Stopped

BOMBS of fiery phosphorus, exploded merely for testing purposes at the Army Proving Ground at Aberdeen, Md., have been causing thousands of unintended casualties; but these are now to be stopped. The casualties have been ducks, especially the precious canvasbacks, shovelling for food in the mud where lurked unburned fragments of the poisonous element from exploded test bombs.

Cessation of the destruction has been brought about through the necessity for dredging up part of the shallow bottom, to make an addition to the airplane landing field. In doing this work, the War Department is receiving the scientific cooperation of the bureau of biological survey, U. S. Department of Agriculture.

Science News Letter, February 3, 1934



Passing months bring the "Great Dipper" of Ursa Major higher into the sky. It and other stars and constellations of the maps appear as represented about 10 p. m. on the first of the month, 9 p. m. on the 15th and 8 p. m. on the 30th.

ASTRONOMY

February to Be Month Without Full Moon

Shortest Month Happens to Fall Within Complete Phase; Planets Poor Attraction But Stars Most Brilliant of Year

By JAMES STOKLEY

THIS MONTH brings high into the southern sky the most brilliant of the constellations, Orion, the mighty warrior, which can be recognized from the three stars forming his belt, above which is the giant Betelgeuse, and below, Rigel. With upraised club in his left arm and a lion skin over his right, Orion is supposed to be warding off the attack of Taurus, the bull, the constellation next towards the west. In Taurus is the red star Aldebaran, which marks the bull's eye and is part of a V-shaped group of stars called the Hyades. A little farther west are the Pleiades, a famous loose cluster of stars, six of which can be seen with the unaided eye.

Nearly overhead and directly north of Orion is the star Capella, part of Auriga, the charioteer. To the southeast of Auriga are two bright stars, Castor and Pollux, forming part of the constellation of Gemini, the twins, and south of them is the lesser dog star, Procyon.

Sirius, the dog star, in Canis Major, the greater dog, is in the south. It is the brightest star in the sky and the nearest of those seen ordinarily from the United States.

The Great Dipper is to the northeast, with the handle downwards and the pointers above. A line from the pointers indicates the pole-star, Polaris. In the northwest, on the other side of the pole, is the constellation of Cassiopeia, shaped like a W on its side.

No bright planets can be seen this month during the whole of the evening; but Mars may be glimpsed early in the evening, just after sunset, and will be accompanied by Mercury about the eighteenth. Jupiter appears in the east about ten o'clock as a brilliant star, and rises higher during the night.

The stars visible this month are the most brilliant that can be seen at any time of the year. Orion is always a delight, whether observed with the naked eye or a small telescope. The star Betelgeuse, brightest in the constellation, is of particular interest because of its great size. Our sun, which is a star, is about 866,000 miles in diameter, but Betelgeuse has a diameter of 215 million miles, which means that if it were a hollow shell 27 million suns could be poured into it. However, it consists of only fifty times as much matter as the sun, because the stuff of which it is made is very diffuse, more so than the highest vacuum that can be attained on earth.

The second brightest star in Orion, Rigel, is also of interest, because it is one of the brightest stars in the sky, not in appearance, but in reality. Sirius, the dog-star, looks the brightest, but that is because it is so close to us, only 8.6 light-years away, and it exceeds the sun in candlepower by only 27 times. Rigel, however, is 14,000 times the intrinsic brightness of the sun, and is 540 light years from us. The light-year, the astronomer's measuring stick, is the distance that a beam of light will travel in a year, going all the time at the rate of 186,000 miles a second, and is equal to approximately six trillion miles.

During February the moon is new on the thirteenth. Last quarter occurs on the seventh, and first quarter on the twenty-first, so that the last few days of the month will have moonlit evenings.

There is no full moon in February, a rather rare occurrence. This is because it is full just at the end of January, and the time between any phase and the same phase again is about 29 days. The moon takes about 28 days to make one circuit about the earth, but during that time the sun has moved eastward a little among the stars, and so the moon has to go that much farther to catch up to it. Full moon happens when the sun and moon are on opposite sides of the earth, and we can see all of the moon's illuminated half. When it is in line with the sun, we can see none of the bright part, but a few days later the young crescent is visible in the western evening twilight.

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Paradox Eclipse

From Page 71

degrees 19 seconds. Expressed in the local civil times of locations of its beginning and ending, the eclipse will begin on February 14 at 6:08 a. m. and end on February 13 at 5:24½ p. m.

It was the Naval Observatory's intention to organize an expedition to observe the eclipse from the Island of Losap, but federal finances did not warrant this expense, which would be very heavy because of the inaccessibility of Losap and the necessity of maintaining a floating base during the period of preparation.

Steamships on the Pacific at the time of the eclipse are being urged by the Navy Department to alter their courses so as to be within the path of total eclipse. The U. S. Naval Observatory through the U. S. Hydrographic Office has furnished mariners with complete suggestions for observing the eclipse in the belief that their observations will be of considerable scientific interest.

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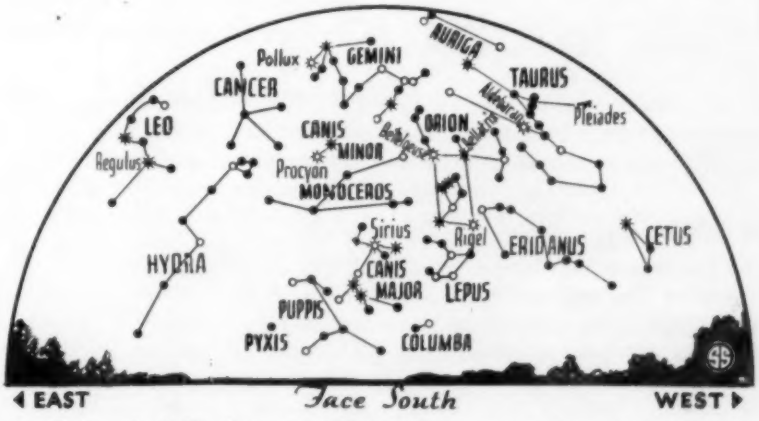

Orion, the bold winter constellation, continues to shine gloriously.

PHYSICS

Neutron Must Be Lighter; New Hope For Atomic Energy

"Merry-go-Round" Atom Gun Shows That Particles of Matter Could Break Up Explosively

NEW HOPE of obtaining energy from the atom and convincing proof that the neutron, important although youthful building block of matter, is lighter than its generally accepted mass figure, have resulted from the latest experiments of Prof. E. O. Lawrence and his associates working with the unique magnetic "merry-go-round" atom gun at the University of California.

The University of California scientists, having faith in their own previous experiments, have continued to devise new and conclusive proofs that the mass of the neutron is 1.0003. Heretofore the whole scientific world was rather thoroughly convinced that this most important constant had the value 1.006. This higher value was proposed by the discoverer of the neutron, Prof. J. Chadwick of Cambridge, and subsequent work seemed to verify it.

Less than a year ago Prof. Lawrence and Drs. Stanley Livingston and M. Henderson, working with deutons (nuclei of heavy mass two hydrogen) made by Prof. G. N. Lewis, found that the deutons apparently split up when bumped hard and gave out more energy than was put in. This could be true only if the neutron were lighter than 1.006.

Such a result was so startling that it was not generally accepted. Physicists offered all possible explanations of how it might be wrong. But the Berkeley workers now announce in the *Physical Review* a further experiment which shows they were right all along.

They bombarded two targets with exactly similar protons of about 3,000,000 volts energy accelerated in their atom gun. One target had ordinary hydrogen in it and nothing happened. The other target was just the same except that heavy mass two isotope (deutons) replaced the ordinary hydrogen. From this target great showers of protons and neutrons were emitted. These often had more energy than the impinging protons. Analysis revealed that these results could be explained only if the neutron's mass is less than 1.0003.

The method is so convincing that the conclusions will be accepted everywhere in spite of the jolt they give the preconceived notions about the structure of the nucleus. First, they mean that the beryllium nucleus, the deuton or heavy isotope of hydrogen nucleus, and the proton are all unstable in the sense that they could break up into parts with explosive violence. They do not and scientists have no notion why.

Some day physicists hope to understand the process and then there will be a chance of obtaining energy from the nucleus. For example, the small difference between 1.006 and 1.0003 means that a pound of heavy hydrogen could give off more heat than the burning of five thousand tons of coal.

Science is still far from such a goal but the nearest approach is in these recent experiments of Prof. Lawrence and his co-workers. They have boosted the efficiency of such processes many thousands of times during the past two years. They report that one proton in four thousand is able to disintegrate a deuton into a proton and a neutron and five million volts. The scientific significance of this high yield is much more important than its possible practical application.

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OPTICS

Special Spectacles Permit Clearer Submarine Vision

SPECIAL underwater spectacles that allow lifeguards and divers to see clearly beneath the water's surface have been devised by Robert E. Cornish of the University of California's Institute of Experimental Biology.

The normal human eye, developed for vision in air, is a very poor instrument under water as every swimmer knows. The reason is that the contact of water with the cornea robs the eye of about two-thirds of its refracting power. This trouble is avoided in divers' outfits by keeping water away from the eye and looking through a flat window of glass. If the glass is wet by condensation or splashing it loses its advantages.

Mr. Cornish considered the normal eye under water as an imperfect eye and designed lenses to correct it. He has constructed two such lenses, and finds excellent underwater vision with them, news print being read without difficulty with one of them, while without the lenses it is not even possible to see that the page contains printing.

Such lenses promise to have value in saving life, where it is necessary to dive for a victim of drowning. Lifeguards now must grope for the victim and must depend largely on sense of touch. Precious moments thus lost have often resulted fatally for the victim.

One type of lens has the advantage that one can see tolerably well either in water or in air. A more rugged construction however is good only under water and is perhaps best used on one eye only. In clear lakes the wearer may see many yards.

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ARCHAEOLOGY

New Discoveries Made At Monte Alban

ENTERING a stone tomb in the graveyard of Monte Alban, where a treasure tomb was discovered in 1932, Mexican archaeologists have made their first big find of the present season.

The tomb contains a strange prehistoric Indian burial, guarded by figures of a big-nosed Indian god and enriched by more than eighty objects such as incense burners, plates for food offerings, and other tomb furnishings.

A single human skeleton was stretched the length of the cell-like tomb, when the archaeologists entered. At the man's head lay three heaps of human bones painted red. These bone heaps are pronounced remains of three men re-buried in this manner long after death. The inside walls and the front of the tomb were also painted red.

Five ornate funerary urns of Zapotecan Indian style, all exactly alike, were in the tomb. Each one is in the form of a big-nosed Zapotecan god, wearing a headdress of flowing plumes, and an ear of corn on either side of the brow.

The tomb is the fortieth opened in three seasons of work at Monte Alban, and richest in the number of articles contained since No. 7 was excavated.

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EDUCATION

Ousted German Scholars Join American Faculties

TWENTY-THREE dismissed German scholars have found intellectual refuge in American educational research institutions, the first report of the Emergency Committee in Aid of Displaced German Scholars issued in New York recently revealed. Grants have been made for placing twelve additional scholars.

Of the twenty-three German professors now at American universities, thirteen are scientists.

"A thrust at the very soul of the university brought into existence the Emergency Committee in Aid of Displaced German Scholars," the report declares. "Approximately fifteen hundred scholars have fallen victim to the attack. Ancient sanctions, rights treasured as inalienable and ideals achieved through sacrifice have been destroyed."

In making public the report, President Livingston Farrand of Cornell University, chairman of the Emergency Committee, declared that the emergency situation is steadily growing more complex and acute.

"The number of actual academic refugees, together with those who might be termed 'potential refugees,' continues to increase," President Farrand said. "We are desirous of rendering the maximum degree of assistance to our German colleagues. We are equally eager to refrain from policies calculated to affect adversely the positions of American scholars."

The report makes clear that funds put at its disposal by various foundations and from private sources were used for grants made to various universities, but that the individual educational institutions were given complete freedom in selecting the German scholars to be called to their faculties.

Prof. James Franck of Göttingen, the eminent physicist, was appointed by both Massachusetts Institute of Technology and Johns Hopkins University. Other scientists are: Prof. O. Szasz, mathematician of Frankfurt, at Massachusetts Institute of Technology; Prof. F. Bernstein, mathematician of Göttingen, at Columbia University; Prof. K. Lewin, psychologist of Berlin, at Cornell University; Prof. H. Lewy, mathematician of Göttingen, at Brown University; Prof. E. Berl, chemist of Darmstadt, at Carnegie Institute of Technology; Prof. E. Noether, mathematician of Göttingen, at Bryn Mawr College; Prof. Felix Bloch, physicist of Leipzig, at Stanford University; Prof. R. Brauer, mathematician of Königsberg, at University of Kentucky; Prof. H. Rosenberg, astronomer of Kiel, at University of Chicago; Prof. Walter Beck, criminologist of Leipzig, at Boston University; Prof. H. Werner, psychologist of Hamburg, at University of Michigan; Prof. Max Sulzbacher, biochemist of Berlin, at Connecticut State College.

The Emergency Committee recalls "occasions in history which offer parallels to the present situation in Germany."

"In the opinion of many students," a statement reads, "the entrance of Greek scholars into Italy after their expulsion from Byzantium in 1453 contributed to hastening the oncoming renaissance of humanism. The world is still in their debt. The emigration of the Huguenots after the revocation of the Edict of Nantes is an event which the English recall with satisfaction for their migration released new forces valuable to social and commercial development. The year 1492 marks two important events, the discovery of America and the expulsion of the Jews from Spain. What America meant subsequently to the Puritans and to the oppressed in other lands is too recent and sacred a memory to require awakening. What the other event, a reverse picture, meant by way of loss to Spain, the Spanish representative to the League of Nations recently made abundantly clear. In a sense the history of the world is a history of migrations. Practical considerations urge upon us here and now in the United States the advisability of recalling, perhaps of profiting from, these plain teachings of history."

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PUBLIC HEALTH

Anti-Plague Commission in Manchuria Made Permanent

THE UNITED Anti-Plague Commission in Manchukuo has been re-established as a permanent organization, according to a report received by the U. S. Public Health Service.

This Commission seems to be a successor to the Manchurian Plague Prevention Service which was disrupted by the invading Japanese forces. When a severe outbreak of plague occurred in Manchukuo last fall, the United Anti-Plague Commission was established to handle the situation.

This Commission consisted of representatives of the Manchukuo government, the Japanese Embassy, the Kwantung Army, and the South Manchuria Railway Company. When the authorities believed that the plague had been exterminated at the end (*Turn Page*)

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of November, the Commission was dissolved. Shortly after, four new cases of plague in Tungliao were reported and certified by the Japanese authorities. This led to reestablishment of the Commission on a permanent basis.

"The Commission intends to send investigation parties to Nungan and Tungliao at the end of June with a view to preventing in the future such epidemics as have occurred," the report states.

"The investigation parties will search the areas to which they are assigned for signs of the plague and even if cases are not discovered all practicable measures will be instituted. The Commission also intends to send licensed doctors in the spring to other places where the plague prevailed in 1933. These doctors, in addition to their ordinary plague prevention duties, intend to make scientific studies of the plague."

The total number of known deaths from the plague up to the middle of December, the latest date for which figures are available, is 1,200. This figure is considered only an approximation because it is impossible for the authorities to obtain complete and accurate information because of the primitive social conditions prevailing in some of the plague-stricken areas.

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A new use has been found for sodium metaphosphate; research indicates that it makes a good cleaning solution for washing dogs and other animals.

A fungus that ruins automobile tops by eating away their wooden hoops, and sometimes the fabric as well, is found to be tough and long-lived by laboratory tests: it is able to grow and reproduce even after five years in a perfectly dry condition.

MEDICINE

Yellow Fever Serum Assures At Least Two-Year Protection

Scientists Do Not Know How Long Immunity May Last; Not Yet Practical to Protect Whole Populations

MISSIONARIES, government officials and scientists whose work takes them into regions where mosquitoes carrying yellow fever may bite them are now being adequately protected against this toll-taking disease.

For two years medical research scientists of the Rockefeller Foundation, working at the Rockefeller Institute for Medical Research, New York, under the leadership of Dr. W. A. Sawyer, have applied practically their vaccination technique. The yellow fever virus used is made safer by at least a hundred passages through white mice. Human blood from those who have had the disease or have been vaccinated is injected along with the weakened virus without bad effects. There results an active immunity similar to that which is caused by an actual attack of the disease.

Yellow fever has martyred scientists who attempted to conquer it. In Africa Drs. Hideyo Noguchi, Adrian Stokes, William Alexander Young and Theodore B. Young died. In Brazil Dr. Paul Lewis died. Today every Rockefeller scientist engaged in the fight is protected by the serum developed by Dr. Sawyer and his associates, Drs. S. F. Kitchen and W. Lloyd.

When in 1931 vaccination against yellow fever was announced to the medical world at a meeting in Philadelphia, it was not known how long the immunity caused by inoculations with immune blood serum would last. Experience has shown it to be very efficient. Protection lasts at least two years.

Now efforts are being centered upon making the injections less difficult and less costly in human blood. It is not yet practical to protect a whole population against yellow fever, but those most in danger can with safety do their work in fever-infested areas.

The Pasteur Institute in Paris has used in its yellow fever vaccinations the blood of immunized horses.

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ETHNOLOGY

Nursery Rimes Traced To Ancient Spells

WHEN mothers play "This little pig went to market" with babies' fingers and toes they are repeating a spell which may date from countless ages ago.

Dr. Margaret Murray of University College, London, has made a study of modern Egyptian nursery and children's rimes, in which she traces some of them back as far as the twelfth dynasty of ancient Egypt, about 2000 B.C.

When the modern Egyptian mother plays with the fingers and toes of her baby instead of singing of little pigs she sings "The Song of the Egg."

It goes like this: 'This is the egg. This is the one who brought it. And this is the one who boiled it. And this is the one who peeled it. And this is the one who ate it all up." And as she pulls the last toe she sings the last line on a high note just as in the English game—the ritual note which completes the spell.

Dr. Murray traces this counting game back to the twelfth dynasty, when the soul of a sorcerer or learned man was not allowed to enter the kingdom of Osiris until he had shown his ability to count his fingers.

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NATURE RAMBLINGS *by Frank Thone*

ORNITHOLOGY

Oil-Bird

FOR MANY ages man has been accustomed to dependency on animals for converting vegetable sugars and starches into fats for his cooking and oils for his lighting. The hog has been the lard animal par excellence and the tallow candles of our grandparents traced their ancestry to sheep and cattle. To be sure, in certain warmer countries such oils as those of olive and palm contributed to man's wants directly; but in northern Europe fats came via the animal route.

Birds did not figure largely, except where, as among the Jews, hog fat was considered unclean or unwholesome. Hence we have the large use of fat geese in all the ghettos of central Europe, and in all the East Sides of American cities.

In Trinidad and adjacent regions of continental South America there is a cave-dwelling bird, the so-called oilbird, that would be a fair competitor for the goose if it were known in temperate regions. It is a relative of the nightjars and owls, but unlike them is not carnivorous. It is a fruit feeder, flying noiselessly at night in search of its food.

In its two-foot, cheese-shaped nest back in the cave its young are marvelously provided for. So much food do the devoted parents bring home that the nestlings become veritable little oil jars, quilted all over with layers of clear fat. The natives raid the caves and massacre these young birds in large numbers for the purpose of getting this natural oil supply. It is easily tried out, and though its scent is disagreeable to European nostrils is esteemed as a great delicacy. It is also used for lighting.

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ENGINEERING

Engineers to Silence Tires, Mufflers and Power Roar

Noise Problems of Automobiles and How They Will be Solved is Topic at S. A. E. Meeting

MORE quiet for auto users is promised by automotive engineers who discussed the problem of noise in automobiles at the Society of Automotive Engineers annual meeting in Detroit.

"Twenty years ago the use of muffler cut-outs was nearly universal, and the thrill of passing someone was incomplete unless your motor had a louder, deeper roar than his," explained Arthur W. Bull of the U. S. Tire Company. "Gradually, noise which had given added exhilaration to the early motorists became a general nuisance."

Motorists are now worried even by the amount of noise that the tires make. As the car mechanism was improved, Mr. Bull explained, noise was reduced to such an extent that tire noise became noticeable at speeds below 40 miles per hour. At higher speeds, wind noises were sufficient to mask tire noises. Now with streamlining becoming more complete, it is necessary for engineers to reduce tire noise at the higher speeds.

With the use of phonograph records, Mr. Bull demonstrated noise that originates from impacts of the tread against the road, noises due to road surfaces, such as the characteristic noise when running over brick pavements, and a low buzz or flutter due to the trapping of air in parts of tires.

The problem of eliminating tire noise is complicated by the fact that some car owners with a musical ear like to hear the low hum which gradually rises in pitch as speed is increased. It serves as a simple and quite accurate speedometer and an aid to maintaining constant speed.

Noise in auto mufflers can be eliminated in two ways, by sound wave absorption and sound wave cancellation or interference, E. G. Gunn of Racine, Wis., told the engineers. In mufflers which absorb the sound, the second energy is converted into heat by resonators, sound absorbing chambers, by friction of the waves passing through small holes and the use of porous material. The trick of mufflers that depend on wave interference consists in getting one part of the sound out of phase with the other so that they interfere or cancel each other. One new muffler passes part of the exhaust gas through a venturi tube and thus creates low pressure which can be used to operate the windshield cleaner, horn, or fuel system.

"Power roar" or intake noise, which is sometimes objectionable in certain automobiles, can be conquered by a silencer which utilizes both resonance chambers and absorbing materials, J. O. Almen and E. E. Wilson, of the General Motors Laboratories, reported.

Automobiles can be made quieter vehicles to ride in by padding their bodies with sound absorbing and insulating material in much the same way that the acoustical properties of radio studies and other rooms can be improved, Theodore M. Prudden, of the Pacific Mills, told the engineers. One result of making automobiles quieter, Mr. Prudden explained, is that the driver often increases speed without realizing it.

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ORNITHOLOGY

Woodpeckers Steal Wasps' Nests to Store Acorns

STOLEN, by bold, bad woodpeckers, a lot of mudwasp nests. It happened in San Diego County, Calif.

California woodpeckers have a habit of drilling tree trunks, house rafters, fence posts, etc. full of holes and then wedging the long, pointed liveoak acorns into them for storage.

In the adobe walls of an abandoned Indian hut, the woodpeckers first riddled the rafters and stuffed the holes with acorns. Then they moved on down the adobe walls and coolly filled the open burrows of a colony of mudwasps that had built their nests in the sun-dried mud bricks. Approximately 120 wasp nests were counted on one corner of the house, and of these over half had been taken over by the woodpeckers.

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First Glances at New Books

Agriculture

NATURAL LAND-USE AREAS OF THE UNITED STATES—C. P. Barnes and F. J. Marschner—*Bureau of Agricultural Economics, U. S. Dept. of Agriculture,* 50c. A large (1:4,000,000) map of the United States, with areas shown in color on the basis of what might be called agricultural ecology. They range all the way from the rich corn lands of the great central valley, the proper use of which cannot be questioned, to lands of more problematical value in the arid, swampy, cut-over or rocky parts of the country, which in the new scheme of things may need to be withdrawn from annual cropping and devoted to other uses.

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Agriculture

TYPE-OF-FARMING AREAS IN THE UNITED STATES, 1930—*Bureau of Agricultural Economics, U. S. Dept. of Agriculture,* 25c. A colored map prepared by the Bureau of Census, Dept. of Commerce, in cooperation with the Bureau of Agricultural Economics, setting forth in considerable detail something over 500 types and sub-types of agricultural areas. This should be of great value to anyone who wishes to develop an understanding of the new national policy of agricultural re-settlement now being worked out in Washington.

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Chronology

THE WORLD'S WORK AND THE CALENDAR—Meredith N. Stiles—*International Fixed Calendar League,* 181 p., $1. An authoritative presentation of the world's need for a new and fixed calendar. The story of the evolution of the Julian-Gregorian calendar is told and along with the chapters explaining the thirteen months plan and the League of Nations activities toward its realization there are chapters summarizing the religious and other objections to this advocated plan. The author is the American Secretary of the International Fixed Calendar League.

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Physics

THEORETICAL PHYSICS, VOL II—W. Wilson—*E. P. Dutton,* 315 p., $5.75. This volume II continues the exposition of the theory of physics with the idea of presenting physical theory as a coherent, logical unity. This volume II covers electromagnetism and optics. Volume I, covering mechanics and heat, has already appeared, while Volume III covering relativity and quantum dynamics is scheduled for future publication. The author is professor of physics, University of London.

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Economic Entomology

TERMITES AND TERMITE CONTROL—Charles A. Kofoid, editor-in-chief—*Univ. of California Press,* xxv+734 p., $5. Although the general press has taken excited notice of termite damage only recently, these wood-voracious insects have been carrying on their campaign of destruction in all except the coldest parts of the United States all the time, and they seem to be extending their territory. The appearance of this book, a publication of a special committee, is most timely, in view of the renewed building activity which the expected return of better economic conditions will bring; yet economic considerations, though given the full treatment they deserve, are not the whole of the work by any means. The initial chapters, on the general biology and ecology of termites, could constitute a separate reference book in "pure" entomology.

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Photography

THE PHOTOGRAPHIC DARKROOM, ITS ARRANGEMENT AND USE—E. J. Wall—*American Photographic Pub. Co.,* 107 p., $1.50. A practical handbook which gives many suggestions and answers many questions.

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Mathematics

DIFFERENTIAL EQUATIONS—Nelson Bush Conkwright—*Macmillan,* 234 p., $1.90. A text based upon the course given by the author who is associate in mathematics at the University of Iowa.

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Standardization—Testing Materials

BOOK OF A. S. T. M. TENTATIVE STANDARDS, 1933—*American Society for Testing Materials,* 1136 p., $8 cloth, $7 paper.

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Housing

THE REBUILDING OF BLIGHTED AREAS—Clarence Arthur Perry—*Regional Plan Assn.,* 59 p., $2. The "blight" referred to is an insidious malady that attacks urban residential districts. It appears first as a barely noticeable deterioration and then progresses gradually through many stages toward a final condition known as the slum. The organization which has done such constructive work in making a plan for the New York region in this volume analyzes the problem of replanning these blighted areas of our cities.

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Natural History

THE ANIMAL KINGDOM—*Orthovis Co. (Chicago),* 33p., $2.15. A book of striking animal pictures, printed by a two-color offset process with a two-color binocular viewing screen to give a startlingly stereoscopic effect. The publishers promise a number of other similar nature books in the near future.

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Archaeology

ARCHEOLOGICAL MONUMENTS OF MEXICO—Department of Education, Republic of Mexico—*Appleton-Century,* 14 p., 150 pl., $3. Except for a few pages of introduction, in Spanish and English, this is a picture book of Mexico's most famous ruins and relics. Scenes from Monte Alban are included, temples at Chichen Itza and other ruined cities, details of sculpture, the tunnels that now run through the great pyramid of Cholula, Tenayuca pyramid before and after excavation, and many another archaeological subject about which much has been written.

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Mechanics

THE AMATEUR MACHINIST—A Frederick Collins—*Appleton-Century,* 300 p., $2. An elementary book explaining how to use machinists' hand and bench tools, the common lathe and the back geared, screw cutting engine lathe, with chapters on mechanical drawings, fits and fitting and finishing metal work.

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